IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:) November 19, 2003

Evan R. Green)

Serial No.: 09/996,176) Group Art Unit: 2819

Filed: November 27, 2001) Examiner: Howard L. Williams

For: **REJECTING INTERFERENCE FOR SIMULTANEOUS RECEIVED SIGNALS**

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Date of Deposit: November 19, 2003.

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APPEAL BRIEF
IN SUPPORT OF APPELLANTS' APPEAL
TO THE BOARD OF PATENT APPEALS AND INTERFERENCES

Sir:

Applicants (hereafter "Appellants") hereby submit this Brief in triplicate in support of their Appeal from a final decision by the Examiner in the above-captioned case. Appellants respectfully request consideration of this Appeal by the Board of Patent Appeals and Interferences for allowance of the claims in the above-captioned patent application.

An oral hearing is not desired.

I. REAL PARTY IN INTEREST

The invention is assigned to Intel Corporation of 2200 Mission College Boulevard, Santa Clara, California 95052.

II. RELATED APPEALS AND INTERFERENCES

To the best of Appellant's knowledge, there are no appeals or interferences related to the present appeal that will directly affect, be directly affected by, or have a bearing on the Board's decision.

III. STATUS OF THE CLAIMS

Claims 6–21 are currently pending in the above-referenced patent application. All claims stand rejected under 35 U.S.C. § 103(a) in the Final Office Action mailed on July 30, 2003 and are the subject of this appeal. These claims stand rejected as being unpatentable over Smith under a U.S. patent 5,444,864 in view of Kenworthy (US 5,691,978) and a Lansford et al. article titled "Wi-Fi (802.11b) and Bluetooth: Enabling Coexistence".

IV. STATUS OF AMENDMENTS

To the best of Appellant's knowledge, no amendments have been filed subsequent to the Final Rejection.

A copy of all claims on appeal, namely claims 6-21, is attached hereto as Appendix A.

V. SUMMARY OF THE INVENTION

Simply stated, Appellant's transceiver provides signal interference reduction during the time that the transmitter transmits a signal having one standard while the receiver processes a signal having a different standard. Examples of different standards may include, for example, an 802.11 signal in the transmitter and a Bluetooth™ signal in the receiver. Appellant's claimed invention includes a cancellation circuit to receive the two differing signals in the transmitter receiver paths. Thus, Appellant's cancellation circuit does not reduce interference from an "echo" signal, but rather injects an out-of-phase transmitter signal into the receiver path to cancel at least a portion of interference from the transmitter path.

VI. ISSUES PRESENTED

The Examiner's rejection of claim's 6-21 under 35 U.S.C. § 103(a) using Smith's U.S. patent 5,444,864 in view of Kenworthy (US 5,691,978) and the Lansford et al. article titled "Wi-Fi (802.11b) and Bluetooth: Enabling Coexistence".

VII. GROUPING OF CLAIMS

For the purposes of this appeal, claims 6-11 and claims 12-17 are grouped together, and claims 18-21 form another group.

VIII. ARGUMENT

The Examiner has rejected claims 6-21 under 35 U.S.C. §103(a) as being unpatentable over Smith in view of Kenworthy and the Lansford et al. article in the Final Office Action mailed on July 30, 2003.

CLAIMS 6-11

Appellant's claim 6 specifically recites:

A device comprising:

an Analog-to-Digital Converter (ADC) to convert data having a first over-the-air interface standard as received in a receiver path;

a Digital-to-Analog Converter (DAC) to convert data having a second over-the-air interface standard to be transmitted in a transmitter path;

a cancellation circuit having a first input coupled to an input of the DAC and a second input coupled to an output of the ADC, wherein the cancellation circuit injects an out-of-phase signal into the receiver path to cancel at least a portion of interference from the transmitter path.

Appellant believes the rejection of claims 6-11 is improper in view of the remarks that follow.

Smith teaches in column 2, lines 31-36, that some part of the transmitted signal leaks through the diplexer to the receiver and mixes with the received signal. Smith includes a signal canceller 12 that has inputs connected to either side of the diplexer to generate a cancellation signal that is used in the receiver path to cancel the unwanted interference. The cancellation signal is gain and phase adjusted to match the leak-through signal in the interfering transmitter. The generated cancellation signal is then subtracted from the received/leak-through signal to cancel the leak-through signal component. Appellant agrees with the Examiner that Smith does not disclose analog-to-digital converters (ADC) in the receive path nor digital-to-analog converters (DAC) in the transmit path.

The Examiner relies upon the reference of Kenworthy to disclose ADCs and DACs in an RF communication system having interference canceling circuitry. Kenworthy discloses a full-duplex system that uses the same spectrum at the same time. Through a combination of antenna placement, analog RF suppression and a digital adaptive filter, the self-interference is cancelled. Kenworthy illustrates in FIG. 3 the use of an ADC 41 in the transmitter path and an ADC 45 in the receiver path. Kenworthy uses a DAC 49 to convert a cancellation signal generated from digital subtractor 47 to a digital signal. In contrast, Appellant's claimed language recites "a

Digital-to-Analog Converter (DAC) to convert data having a second over-the-air interface standard to be transmitted in a transmitter path". It is respectfully pointed out that neither Kenworthy nor Smith teach or suggest a DAC to convert data ... to be transmitted in a transmitter path. The DAC disclosed by Kenworthy is in the receiver path, not the transmitter path as claimed by the Appellant.

It is well established that obviousness requires a teaching or a suggestion by the relied upon prior art of all the elements of a claim (M.P.E.P. §2142). Appellant respectfully submits that neither Smith nor Kenworthy teach a DAC to convert data to be transmitted in a transmitter path, as claimed in Appellant's claim 6. Thus, the relied upon references do not meet the requirements to establish an obvious rejection. Thus, at a minimum, the rejection of claim 6 is improper in that Smith and Kenworthy fail to teach or suggest every feature of that claim.

Appellant's claims 7-11 depend from base claim 6 and are believed to be allowable over the relied upon reference for at least the same reasons as claim 6.

CLAIMS 12-17

Appellant's claim 12 recites:

A system comprising:

a transmit path to receive transmitter digital data to convert to a transmitter analog signal having a first over-the-air interface standard;

a receive path to receive a receiver analog signal having a second over-the-air interface standard to convert to receiver digital data; and

a cancellation circuit having inputs to receive the transmitter digital data and the receiver digital data and generate an out-of-phase signal that is combined with the receiver analog signal to cancel at least a portion of interference from the transmitter path in the receive path.

Appellant believes the rejection of claims 12-17 is improper in view of the remarks that follow.

Appellant respectfully submits that neither Smith nor Kenworthy teach "a cancellation circuit having inputs to receive the transmitter digital data and the receiver

digital data and generate an out-of-phase signal that is combined with the receiver analog signal to cancel at least a portion of interference from the transmitter path in the receive path". As previously stated, the Examiner states that the relied upon reference of Smith does not disclose analog-to-digital converters (ADC) in the receive path nor digital-to-analog converters (DAC) in the transmit path, and Appellant agrees. Further, the cancellation circuit disclosed by Smith in FIG. 1 receives analog signals from the transmitter and receiver paths, not digital data as claimed in Appellant's claim 12. The Examiner relies upon the reference of Kenworthy in FIG. 3 to show the ADCs that provide the digital signals. In this figure, a FIR filter 43 receives the transmitter digital data and a digital subtractor 47 receives the receiver digital data. To satisfy the Appellant's claim language both the FIR filter 43 and the subtractor 47 must be taken together as the equivalent of Appellant's cancellation circuit in order to have "inputs to receive the transmitter digital data and the receiver digital".

However, although the combination of FIR filter 43 and subtractor 47 satisfy some limitations of Appellant's claim 12, that combination prevents satisfying other limitations. Namely, with the FIR filter 43 and subtractor 47 combined, that combination does not generate an out-of-phase signal that is combined with the receiver analog signal to cancel at least a portion of interference from the transmitter path in the receive path. Note that it is the FIR filter 43 alone that generates the cancellation signal, not the combination of FIR filter 43 and subtractor 47. Accordingly, the relied upon reference of Smith and Kenworthy, even with Lansford, fail to meet the requirements to establish an obvious rejection, and therefore, the rejection of claim 12 is improper .

Appellant's claims 13-17 depend from base claim 12 and are believed to be allowable over the relied upon reference for at least the same reasons as claim 12.

<u>CLAIMS 18-21</u>

Appellant's claim 18 recites:

A method comprising:

converting a first digital value to an analog signal in a transmitter;

converting a signal received by a receiver that contains a portion of the analog signal as interference to a second digital value, where the analog signal in the

transmitter and the signal received by the receiver have differing over-the-air interface standards; and

processing the first and second digital values to generate an out-of-phase signal that is combined with the signal received by the receiver to mitigate the interference in the signal converted by the receiver.

Appellant believes the rejection of claims 18-21 is improper in view of the remarks that follow.

Smith teaches in column 2, lines 31-36, that the diplexer allows some part of the transmitted signal to "leak-through", resulting in an unwanted interference signal in the receiver. Smith shows in FIG. 1 a signal canceler circuit that receives analog signals and not digital values as claimed in Appellant's claim 18.

Kenworthy teaches in column 2, lines 18-31, a self-canceling full-duplex system capable of subtracting some of the self transmitted signal from the receive antenna. Kenworthy does not show a DAC for "converting a first digital value to an analog signal in a transmitter" as claimed in Appellant's claim 18. The DAC shown by Kenworthy is in the receiver path, not the transmitter path. Both Smith and Kenworthy teach using their cancellation circuits to preserve the received signal from interference caused by leak-through or reflection of the transmitted signal. In other words, both Smith and Kenworthy teach that the signal in the transmitter and the signal received by the receiver have the same interface standard, not differing over-the-air interface standards as claimed in Appellant's claim 18.

The Examiner relies on the Lansford et al. article to show that interference between signals with differing over-the-air interface standards is not unexpected and that collisions happen at the physical layer. The Examiner draws our attention to page 26, right column, last paragraph) that states "Only by the use of signal processing techniques in the PHY layer can the Bluetooth signal be excised from the 802.11(b) passband…". It should be pointed out that the Examiner stopped short in order to make his point about interfering signals, but the remainder of the sentence shows that Lansford's point was "so that the ACK can be successfully processed". Lansford is teaching that collisions in the physical layer cannot be avoided because the 802.11b

specification requires that an ACK signal be transmitted within a few microseconds after a packet has successfully been received.

The relied upon references of Smith and Kenworthy are deficient in that Smith teaches cancellation using analog signals, Kenworthy does not have a DAC in the transmitter path, and Lansford teaches that the Bluetooth™ signal may collide with the ACK signal for the 802.11b. Thus, the relied upon references of Smith, Kenworthy and Lansford, either taken singularly or in combination, have failed to establish an obvious rejection in that they fail to teach or suggest every feature of Appellant's claim 18. Therefore, these references do not meet the requirements and cannot make Appellant's claim 18 obvious.

Appellant's claims 19-21 depend from amended base claim 18 and are believed to be allowable over the relied upon reference for at least the same reasons as claim 18.

IX. CONCLUSION

Appellants respectfully submit that all the pending claims in this patent application are patentable and request that the Board of Patent Appeals and Interferences overrule the Examiner and direct allowance of the rejected claims.

This brief is submitted in triplicate. The required fee for filing a brief in support of an appeal is enclosed. Should it be determined that an additional fee is due under 37 CFR §§1.16 or 1.17, or any excess fee has been received, please charge that fee or credit the amount of overcharge to deposit account #50-0221.

Respectfully submitted,

Date: 11-19-2003

Lanny L. Parker

Lanny L. Parker

Patent Agent for Appellant
Registration Number: 44,281

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X. APPENDIX A: CLAIMS ON APPEAL

6(Once amended). A device comprising:

an Analog-to-Digital Converter (ADC) to convert data having a first over-the-air interface standard as received in a receiver path;

a Digital-to-Analog Converter (DAC) to convert data having a second over-the-air interface standard to be transmitted in a transmitter path; and

a cancellation circuit having a first input coupled to an input of the DAC and a second input coupled to an output of the ADC, wherein the cancellation circuit injects an out-of-phase signal into the receiver path to cancel at least a portion of interference from the transmitter path.

7. The device of claim 6 further comprising a subtractor circuit having a first input coupled to an input of the receiver path and a second input coupled to an output of the cancellation circuit.

8(Once Amended). The device of claim 7 further comprising a first antenna coupled to an output of the DAC to provide signals for Bluetooth™ and IEEE 802.11b.

9(Once Amended). The device of claim 8 further comprising a second antenna coupled to an input of the ADC to receive Bluetooth™ and IEEE 802.11b signals.

10. The device of claim 9 wherein the first antenna is placed orthogonal to the second antenna.

11. The device of claim 10 wherein the subtractor circuit has the first input coupled to the second antenna.

12(Twice Amended). A system comprising:

a transmit path to receive transmitter digital data to convert to a transmitter analog signal having a first over-the-air interface standard;

a receive path to receive a receiver analog signal having a second over-the-air interface standard to convert to receiver digital data; and

a cancellation circuit having inputs to receive the transmitter digital data and the receiver digital data and generate an out-of-phase signal that is combined with the receiver analog signal to cancel at least a portion of interference from the transmitter path in the receive path.

13(Once Amended). The system of claim 12 further comprising a subtractor circuit having a first input coupled to an output of the cancellation circuit and a second input coupled to receive the receiver analog signal, and an output to provide a signal in the receive path having mitigated interference.

14. The system of claim 12 wherein the transmit path further includes a Digital-to-Analog Converter (DAC) having an input coupled to receive the transmitter digital data and having an output to provide the transmitter analog signal.

15. The system of claim 12 wherein the receive path further includes an Analog-to-Digital Converter (ADC) having an input coupled to receive the receiver analog signal and having an output to provide the receiver digital data.

16(Once Amended). The system of claim 12 wherein the receive path further includes:

a first antenna coupled to an output of the DAC to provide Bluetooth™ and IEEE 802.11b signals; and

a second antenna coupled to an input of the ADC to receive signals for Bluetooth™ and IEEE 802.11b.

17. The system of claim 16 wherein the first antenna is placed orthogonal to the second antenna.

18(Once Amended). A method comprising:

converting a first digital value to an analog signal in a transmitter;

converting a signal received by a receiver that contains a portion of the analog signal as interference to a second digital value, where the analog signal in the transmitter and the signal received by the receiver have differing over-the-air interface standards; and

processing the first and second digital values to generate an out-of-phase signal that is combined with the signal received by the receiver to mitigate the interference in the signal converted by the receiver.

19. The method of claim 18, wherein processing the first and second digital values further comprises generating a signal that is out-of-phase to the portion of the analog signal contained in the signal received by the receiver.

20. The method of claim 19 further comprising subtracting the signal that is out-of-phase from the signal received by the receiver.

21. The method of claim 20 further comprising receiving the signal in the receiver orthogonal to the analog signal in the transmitter.

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Lisa M Hopkinson 11-19-03
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Appellant's claims 7-11 depend from base claim 6 and are believed to be allowable over the relied upon reference for at least the same reasons as claim 6.

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Appellant's claim 12 recites:

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However, although the combination of FIR filter 43 and subtractor 47 satisfy some limitations of Appellant's claim 12, that combination prevents satisfying other limitations. Namely, with the FIR filter 43 and subtractor 47 combined, that combination does not generate an out-of-phase signal that is combined with the receiver analog signal to cancel at least a portion of interference from the transmitter path in the receive path. Note that it is the FIR filter 43 alone that generates the cancellation signal, not the combination of FIR filter 43 and subtractor 47. Accordingly, the relied upon reference of Smith and Kenworthy, even with Lansford, fail to meet the requirements to establish an obvious rejection, and therefore, the rejection of claim 12 is improper .

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converting a signal received by a receiver that contains a portion of the analog signal as interference to a second digital value, where the analog signal in the

transmitter and the signal received by the receiver have differing over-the-air interface standards; and

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Appellant's claims 19-21 depend from amended base claim 18 and are believed to be allowable over the relied upon reference for at least the same reasons as claim 18.

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X. APPENDIX A: CLAIMS ON APPEAL

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a cancellation circuit having a first input coupled to an input of the DAC and a second input coupled to an output of the ADC, wherein the cancellation circuit injects an out-of-phase signal into the receiver path to cancel at least a portion of interference from the transmitter path.

7. The device of claim 6 further comprising a subtractor circuit having a first input coupled to an input of the receiver path and a second input coupled to an output of the cancellation circuit.

8(Once Amended). The device of claim 7 further comprising a first antenna coupled to an output of the DAC to provide signals for Bluetooth™ and IEEE 802.11b.

9(Once Amended). The device of claim 8 further comprising a second antenna coupled to an input of the ADC to receive Bluetooth™ and IEEE 802.11b signals.

10. The device of claim 9 wherein the first antenna is placed orthogonal to the second antenna.

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a transmit path to receive transmitter digital data to convert to a transmitter analog signal having a first over-the-air interface standard;

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13(Once Amended). The system of claim 12 further comprising a subtractor circuit having a first input coupled to an output of the cancellation circuit and a second input coupled to receive the receiver analog signal, and an output to provide a signal in the receive path having mitigated interference.

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15. The system of claim 12 wherein the receive path further Includes an Analog-to-Digital Converter (ADC) having an Input coupled to receive the receiver analog signal and having an output to provide the receiver digital data.

16(Once Amended). The system of claim 12 wherein the receive path further includes:

a first antenna coupled to an output of the DAC to provide Bluetooth™ and IEEE 802.11b signals; and

a second antenna coupled to an input of the ADC to receive signals for Bluetooth™ and IEEE 802.11b.

17. The system of claim 16 wherein the first antenna is placed orthogonal to the second antenna.

18(Once Amended). A method comprising:

converting a first digital value to an analog signal in a transmitter;

converting a signal received by a receiver that contains a portion of the analog signal as interference to a second digital value, where the analog signal in the transmitter and the signal received by the receiver have differing over-the-air interface standards; and

processing the first and second digital values to generate an out-of-phase signal that is combined with the signal received by the receiver to mitigate the interference in the signal converted by the receiver.

19. The method of claim 18, wherein processing the first and second digital values further comprises generating a signal that is out-of-phase to the portion of the analog signal contained in the signal received by the receiver.

20. The method of claim 19 further comprising subtracting the signal that is out-of-phase from the signal received by the receiver.

21. The method of claim 20 further comprising receiving the signal in the receiver orthogonal to the analog signal in the transmitter.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	)	November 19, 2003
	)	
Evan R. Green	)	
	)	
Serial No.: 09/996,176	)	Group Art Unit: 2819
	)	
Filed: November 27, 2001	)	Examiner: Howard L. Williams

For: **REJECTING INTERFERENCE FOR SIMULTANEOUS RECEIVED SIGNALS**

CERTIFICATE OF MAILING/TRANSMISSION

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APPEAL BRIEF
IN SUPPORT OF APPELLANTS' APPEAL
TO THE BOARD OF PATENT APPEALS AND INTERFERENCES

Sir:

Applicants (hereafter "Appellants") hereby submit this Brief in triplicate in support of their Appeal from a final decision by the Examiner in the above-captioned case. Appellants respectfully request consideration of this Appeal by the Board of Patent Appeals and Interferences for allowance of the claims in the above-captioned patent application.

An oral hearing is not desired.

I. REAL PARTY IN INTEREST

The invention is assigned to Intel Corporation of 2200 Mission College Boulevard, Santa Clara, California 95052.

II. RELATED APPEALS AND INTERFERENCES

To the best of Appellant's knowledge, there are no appeals or interferences related to the present appeal that will directly affect, be directly affected by, or have a bearing on the Board's decision.

III. STATUS OF THE CLAIMS

Claims 6–21 are currently pending in the above-referenced patent application. All claims stand rejected under 35 U.S.C. § 103(a) in the Final Office Action mailed on July 30, 2003 and are the subject of this appeal. These claims stand rejected as being unpatentable over Smith under a U.S. patent 5,444,864 in view of Kenworthy (US 5,691,978) and a Lansford et al. article titled "Wi-Fi (802.11b) and Bluetooth: Enabling Coexistence".

IV. STATUS OF AMENDMENTS

To the best of Appellant's knowledge, no amendments have been filed subsequent to the Final Rejection.

A copy of all claims on appeal, namely claims 6-21, is attached hereto as Appendix A.

V. SUMMARY OF THE INVENTION

Simply stated, Appellant's transceiver provides signal interference reduction during the time that the transmitter transmits a signal having one standard while the receiver processes a signal having a different standard. Examples of different standards may include, for example, an 802.11 signal in the transmitter and a Bluetooth™ signal in the receiver. Appellant's claimed invention includes a cancellation circuit to receive the two differing signals in the transmitter receiver paths. Thus, Appellant's cancellation circuit does not reduce interference from an "echo" signal, but rather injects an out-of-phase transmitter signal into the receiver path to cancel at least a portion of interference from the transmitter path.

VI. ISSUES PRESENTED

The Examiner's rejection of claim's 6-21 under 35 U.S.C. § 103(a) using Smith's U.S. patent 5,444,864 in view of Kenworthy (US 5,691,978) and the Lansford et al. article titled "Wi-Fi (802.11b) and Bluetooth: Enabling Coexistence".

VII. GROUPING OF CLAIMS

For the purposes of this appeal, claims 6-11 and claims 12-17 are grouped together, and claims 18-21 form another group.

VIII. ARGUMENT

The Examiner has rejected claims 6-21 under 35 U.S.C. §103(a) as being unpatentable over Smith in view of Kenworthy and the Lansford et al. article in the Final Office Action mailed on July 30, 2003.

CLAIMS 6-11

Appellant's claim 6 specifically recites:

A device comprising:

an Analog-to-Digital Converter (ADC) to convert data having a first over-the-air interface standard as received in a receiver path;

a Digital-to-Analog Converter (DAC) to convert data having a second over-the-air interface standard to be transmitted in a transmitter path;

a cancellation circuit having a first input coupled to an input of the DAC and a second input coupled to an output of the ADC, wherein the cancellation circuit injects an out-of-phase signal into the receiver path to cancel at least a portion of interference from the transmitter path.

Appellant believes the rejection of claims 6-11 is Improper in view of the remarks that follow.

Smith teaches in column 2, lines 31-36, that some part of the transmitted signal leaks through the diplexer to the receiver and mixes with the received signal. Smith includes a signal canceller 12 that has inputs connected to either side of the diplexer to generate a cancellation signal that is used in the receiver path to cancel the unwanted interference. The cancellation signal is gain and phase adjusted to match the leak-through signal in the interfering transmitter. The generated cancellation signal is then subtracted from the received/leak-through signal to cancel the leak-through signal component. Appellant agrees with the Examiner that Smith does not disclose analog-to-digital converters (ADC) in the receive path nor digital-to-analog converters (DAC) In the transmit path.

The Examiner relies upon the reference of Kenworthy to disclose ADCs and DACs in an RF communication system having interference canceling circuitry. Kenworthy discloses a full-duplex system that uses the same spectrum at the same time. Through a combination of antenna placement, analog RF suppression and a digital adaptive filter, the self-interference is cancelled. Kenworthy illustrates in FIG. 3 the use of an ADC 41 in the transmitter path and an ADC 45 in the receiver path. Kenworthy uses a DAC 49 to convert a cancellation signal generated from digital subtractor 47 to a digital signal. In contrast, Appellant's claimed language recites "a

Digital-to-Analog Converter (DAC) to convert data having a second over-the-air interface standard to be transmitted in a transmitter path". It is respectfully pointed out that neither Kenworthy nor Smith teach or suggest a DAC to convert data ... to be transmitted in a transmitter path. The DAC disclosed by Kenworthy is in the receiver path, not the transmitter path as claimed by the Appellant.

It is well established that obviousness requires a teaching or a suggestion by the relied upon prior art of all the elements of a claim (M.P.E.P. §2142). Appellant respectfully submits that neither Smith nor Kenworthy teach a DAC to convert data to be transmitted in a transmitter path, as claimed in Appellant's claim 6. Thus, the relied upon references do not meet the requirements to establish an obvious rejection. Thus, at a minimum, the rejection of claim 6 is improper in that Smith and Kenworthy fail to teach or suggest every feature of that claim.

Appellant's claims 7-11 depend from base claim 6 and are believed to be allowable over the relied upon reference for at least the same reasons as claim 6.

CLAIMS 12-17

Appellant's claim 12 recites:

A system comprising:

a transmit path to receive transmitter digital data to convert to a transmitter analog signal having a first over-the-air interface standard;

a receive path to receive a receiver analog signal having a second over-the-air interface standard to convert to receiver digital data; and

a cancellation circuit having inputs to receive the transmitter digital data and the receiver digital data and generate an out-of-phase signal that is combined with the receiver analog signal to cancel at least a portion of interference from the transmitter path in the receive path.

Appellant believes the rejection of claims 12-17 is improper in view of the remarks that follow.

Appellant respectfully submits that neither Smith nor Kenworthy teach "a cancellation circuit having inputs to receive the transmitter digital data and the receiver

digital data and generate an out-of-phase signal that is combined with the receiver analog signal to cancel at least a portion of interference from the transmitter path in the receive path". As previously stated, the Examiner states that the relied upon reference of Smith does not disclose analog-to-digital converters (ADC) in the receive path nor digital-to-analog converters (DAC) in the transmit path, and Appellant agrees. Further, the cancellation circuit disclosed by Smith in FIG. 1 receives analog signals from the transmitter and receiver paths, not digital data as claimed in Appellant's claim 12. The Examiner relies upon the reference of Kenworthy in FIG. 3 to show the ADCs that provide the digital signals. In this figure, a FIR filter 43 receives the transmitter digital data and a digital subtractor 47 receives the receiver digital data. To satisfy the Appellant's claim language both the FIR filter 43 and the subtractor 47 must be taken together as the equivalent of Appellant's cancellation circuit in order to have "inputs to receive the transmitter digital data and the receiver digital".

However, although the combination of FIR filter 43 and subtractor 47 satisfy some limitations of Appellant's claim 12, that combination prevents satisfying other limitations. Namely, with the FIR filter 43 and subtractor 47 combined, that combination does not generate an out-of-phase signal that is combined with the receiver analog signal to cancel at least a portion of interference from the transmitter path in the receive path. Note that it is the FIR filter 43 alone that generates the cancellation signal, not the combination of FIR filter 43 and subtractor 47. Accordingly, the relied upon reference of Smith and Kenworthy, even with Lansford, fail to meet the requirements to establish an obvious rejection, and therefore, the rejection of claim 12 is improper .

Appellant's claims 13-17 depend from base claim 12 and are believed to be allowable over the relied upon reference for at least the same reasons as claim 12.

CLAIMS 18-21

Appellant's claim 18 recites:

A method comprising:

converting a first digital value to an analog signal in a transmitter;

converting a signal received by a receiver that contains a portion of the analog signal as interference to a second digital value, where the analog signal in the

transmitter and the signal received by the receiver have differing over-the-air interface standards; and

processing the first and second digital values to generate an out-of-phase signal that is combined with the signal received by the receiver to mitigate the interference in the signal converted by the receiver.

Appellant believes the rejection of claims 18-21 is improper in view of the remarks that follow.

Smith teaches in column 2, lines 31-36, that the diplexer allows some part of the transmitted signal to "leak-through", resulting in an unwanted interference signal in the receiver. Smith shows in FIG. 1 a signal canceler circuit that receives analog signals and not digital values as claimed in Appellant's claim 18.

Kenworthy teaches in column 2, lines 18-31, a self-canceling full-duplex system capable of subtracting some of the self transmitted signal from the receive antenna. Kenworthy does not show a DAC for "converting a first digital value to an analog signal in a transmitter" as claimed in Appellant's claim 18. The DAC shown by Kenworthy is in the receiver path, not the transmitter path. Both Smith and Kenworthy teach using their cancellation circuits to preserve the received signal from interference caused by leak-through or reflection of the transmitted signal. In other words, both Smith and Kenworthy teach that the signal in the transmitter and the signal received by the receiver have the same interface standard, not differing over-the-air interface standards as claimed in Appellant's claim 18.

The Examiner relies on the Lansford et al. article to show that interference between signals with differing over-the-air interface standards is not unexpected and that collisions happen at the physical layer. The Examiner draws our attention to page 26, right column, last paragraph) that states "Only by the use of signal processing techniques in the PHY layer can the Bluetooth signal be excised from the 802.11(b) passband...". It should be pointed out that the Examiner stopped short in order to make his point about interfering signals, but the remainder of the sentence shows that Lansford's point was "so that the ACK can be successfully processed". Lansford is teaching that collisions in the physical layer cannot be avoided because the 802.11b

specification requires that an ACK signal be transmitted within a few microseconds after a packet has successfully been received.

The relied upon references of Smith and Kenworthy are deficient in that Smith teaches cancellation using analog signals, Kenworthy does not have a DAC in the transmitter path, and Lansford teaches that the Bluetooth™ signal may collide with the ACK signal for the 802.11b. Thus, the relied upon references of Smith, Kenworthy and Lansford, either taken singularly or in combination, have failed to establish an obvious rejection in that they fail to teach or suggest every feature of Appellant's claim 18. Therefore, these references do not meet the requirements and cannot make Appellant's claim 18 obvious.

Appellant's claims 19-21 depend from amended base claim 18 and are believed to be allowable over the relied upon reference for at least the same reasons as claim 18.

IX. CONCLUSION

Appellants respectfully submit that all the pending claims in this patent application are patentable and request that the Board of Patent Appeals and Interferences overrule the Examiner and direct allowance of the rejected claims.

This brief is submitted in triplicate. The required fee for filing a brief in support of an appeal is enclosed. Should it be determined that an additional fee is due under 37 CFR §§1.16 or 1.17, or any excess fee has been received, please charge that fee or credit the amount of overcharge to deposit account #50-0221.

Respectfully submitted,

Date: 11-19-2003

Lanny L. Parker

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X. APPENDIX A: CLAIMS ON APPEAL

6(Once amended). A device comprising:

an Analog-to-Digital Converter (ADC) to convert data having a first over-the-air interface standard as received In a receiver path;

a Digital-to-Analog Converter (DAC) to convert data having a second over-the-air interface standard to be transmitted in a transmitter path; and

a cancellation circuit having a first input coupled to an input of the DAC and a second input coupled to an output of the ADC, wherein the cancellation circuit injects an out-of-phase signal into the receiver path to cancel at least a portion of interference from the transmitter path.

7. The device of claim 6 further comprising a subtractor circuit having a first input coupled to an input of the receiver path and a second input coupled to an output of the cancellation circuit.

8(Once Amended). The device of claim 7 further comprising a first antenna coupled to an output of the DAC to provide signals for Bluetooth™ and IEEE 802.11b.

9(Once Amended). The device of claim 8 further comprising a second antenna coupled to an input of the ADC to receive Bluetooth™ and IEEE 802.11b signals.

10. The device of claim 9 wherein the first antenna is placed orthogonal to the second antenna.

11. The device of claim 10 wherein the subtractor circuit has the first input coupled to the second antenna.

12(Twice Amended). A system comprising:

a transmit path to receive transmitter digital data to convert to a transmitter analog signal having a first over-the-air interface standard;

a receive path to receive a receiver analog signal having a second over-the-air interface standard to convert to receiver digital data; and

a cancellation circuit having inputs to receive the transmitter digital data and the receiver digital data and generate an out-of-phase signal that is combined with the receiver analog signal to cancel at least a portion of interference from the transmitter path in the receive path.

13(Once Amended). The system of claim 12 further comprising a subtractor circuit having a first input coupled to an output of the cancellation circuit and a second input coupled to receive the receiver analog signal, and an output to provide a signal in the receive path having mitigated interference.

14. The system of claim 12 wherein the transmit path further includes a Digital-to-Analog Converter (DAC) having an input coupled to receive the transmitter digital data and having an output to provide the transmitter analog signal.

15. The system of claim 12 wherein the receive path further includes an Analog-to-Digital Converter (ADC) having an input coupled to receive the receiver analog signal and having an output to provide the receiver digital data.

16(Once Amended). The system of claim 12 wherein the receive path further includes:

a first antenna coupled to an output of the DAC to provide Bluetooth™ and IEEE 802.11b signals; and

a second antenna coupled to an input of the ADC to receive signals for Bluetooth™ and IEEE 802.11b.

17. The system of claim 16 wherein the first antenna is placed orthogonal to the second antenna.

18(Once Amended). A method comprising:

converting a first digital value to an analog signal in a transmitter;

converting a signal received by a receiver that contains a portion of the analog signal as interference to a second digital value, where the analog signal in the transmitter and the signal received by the receiver have differing over-the-air interface standards; and

processing the first and second digital values to generate an out-of-phase signal that is combined with the signal received by the receiver to mitigate the interference in the signal converted by the receiver.

19. The method of claim 18, wherein processing the first and second digital values further comprises generating a signal that is out-of-phase to the portion of the analog signal contained in the signal received by the receiver.

20. The method of claim 19 further comprising subtracting the signal that is out-of-phase from the signal received by the receiver.

21. The method of claim 20 further comprising receiving the signal in the receiver orthogonal to the analog signal in the transmitter.